



2020 REPORT ON THE HEALTH OF COLORADO'S FORESTS

Protecting Our Future After a Historic Wildfire Year





West of Grand Lake, only a house foundation and charred trees remain after the East Troublesome Fire. The second largest wildfire in state history left thousands of dead trees in critical watersheds along the Colorado River that will require mitigation. Photo: Zach Wehr, CSFS

Colorado Department of Natural Resources

Colorado State Forest Service

We Must Do More to Match Our Forest Health Challenge



Dan Gibbs

In the midst of the most serious public health crisis of the 21st century, we also experienced an unprecedented wildfire season. The 2020 Colorado wildfires, including the three largest in our state's history, burned over 600,000 acres in some of our most pristine watersheds due to severe drought and high fuel loads. My thoughts are with all those impacted. I thank

all of the firefighters, first responders and those working on wildfire preparedness and recovery for their service.

As the director of the Colorado Department of Natural Resources and a certified wildland firefighter, I know firsthand the critical importance of forest health. Healthy forests protect public health and safety, water resources, wildlife habitat and recreation. I am honored to work with the Colorado State Forest Service to ensure Coloradans have support for forest stewardship and education, community risk assessments and fuels reduction.

As the *2020 Report on the Health of Colorado's Forests* emphasizes, we must do more to match the scale of our forest health challenge. A century of fire suppression, our warming climate and more people living in the wildland-urban interface create the perfect conditions for wildfire tragedies like those we experienced last year. Colorado's Shared Stewardship agreement and the Rocky Mountain Restoration Initiative bring much-needed strategic focus to restoring forest health at landscape scales, and we need everyone at the table to enhance the resilience of Colorado's forests and protect people, the environment and our way of life for future generations.

Dan Gibbs, Executive Director,
Colorado Department of Natural Resources



Michael B. Lester

Last year was challenging for all of us, but it also reminded us how important our forests are. Living through a pandemic, Coloradans escaped to our wildland and urban forests seeking tranquility, peace and a place to recreate and exercise.

Along with supporting our mental and physical health, our forests provide habitat for Colorado's charismatic wildlife, bolster

local economies through the forest products industry, sequester carbon and help filter clean air, as well as provide clean water for Colorado, 18 other states and Mexico.

Many of Colorado's forests depend on some wildfire to regenerate, but the types of uncharacteristic fires we saw last year put these benefits in jeopardy. I watched, with all of you, in horror and amazement as our forests burned in historic fashion, leading to the state's three largest wildfires and a host of social, economic, health and resource problems.

Our forests are experiencing many challenges, from longer fire seasons to ongoing drought to more people living in the wildland-urban interface. In the face of these challenges, the Colorado State Forest Service and its partners are making a difference, as you'll read in this report. That way, when fires like we saw last year occur again, they won't be as severe or costly to Coloradans.

After 2020, we now better understand just how much we need our forests — and what can happen if we don't invest in maintaining their health. We all need to do more so our forests continue to provide priceless benefits now and into the future.

Michael B. Lester, State Forester and Director,
Colorado State Forest Service

The spruce beetle remains the most damaging forest pest in Colorado. Read about the state's prominent forest insects and diseases — and how bark beetles affect wildfire behavior.



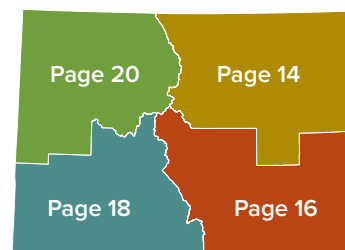
PAGE 12



PAGE 5

The forest management needed to reduce wildfire risk to residents, lands, water supplies and economies is not happening fast enough. Read analysis of the historic wildfire year and what the Colorado State Forest Service is doing to meet this growing challenge.

2020 KEY FOREST TAKEAWAYS



PAGE 11



Forests benefit Colorado residents in many ways. They are an important source of revenue through outdoor recreation and forest products. They also provide clean air and water, wildlife habitat and physical and mental health benefits. Learn about how forests also need to be healthy in order to store carbon and mitigate climate change.

PAGE 22



The Forest Restoration and Wildfire Risk Mitigation Grant Program continues to be a critical source of funding to address forest health on a local level. Read about how a state grant helped a community in Colorado Springs successfully mitigate its wildfire risk prior to the Bear Creek Fire in November.

Despite the pandemic, the Colorado State Forest Service continues to work alongside landowners and strategic partners to improve forest health and reduce wildfire risk where it is most needed. Read about CSFS projects happening in every corner of Colorado.

Forest Action Plan Maps Colorado's Forest Health Priorities Over Next 10 Years



csfs.colostate.edu/forest-action-plan

Coloradans know our forests contribute greatly to our state's economic and social well-being. They provide us with what we need to survive and thrive, including clean air and water, habitat for wildlife, world-renowned recreation opportunities to experience and more.

As stewards of our forests, the Colorado State Forest Service recently unveiled the *2020 Colorado Forest Action Plan* — a road map that guides forest management for the next decade. Rooted in science and driven by collaboration, this 85-page report built by the CSFS, federal, state and community partners provides an in-depth analysis and solutions to improve the health of Colorado's forests and ensure they persevere.

It's up to each of us to be good stewards of our wild spaces and do our part to keep the "Colorful Colorado" nickname living strong. Here at the CSFS, we're looking forward to the next decade, continuing to steer Colorado's forests to health and longevity for future generations.



The 2020 wildfire season brought three record-breaking blazes to the Colorado landscape.

Above: The Cameron Peak Fire, the state's largest wildfire, crests a hillside above Loveland at night. Photo: Amy Bulger, CSFS

Right: The plume from the state's second largest wildfire, the East Troublesome Fire that ignited near Granby, covered skies near Walden. Photo: Blair Rynearson, CSFS



Until Colorado takes greater action,

wildfires will remain a problem and continue to affect our air, our water and our safety.

As the 2020 fire season clearly illustrated,

the forest management needed to reduce fuels and mitigate wildfire risk to Colorado's residents, lands and water supplies is not happening fast enough.

We are primed to face the same types of uncharacteristic wildfires we saw last year

unless an increase in the pace and scale of forest management is made a statewide priority, work is done more quickly and the buildup of beetle-killed and living fuels is addressed across the landscape in areas that can be accessed. Fire plays a crucial role in the long-term health and resiliency of fire-dependent forests in Colorado, but a long history of fire suppression and lack of forest management, combined with more people living in the wildland-urban interface, have led to a growing and unsustainable problem for our state.



Wildfire Season Highlights the Growing Need to Increase Forest Management Across State

In 2020, Colorado experienced a record-breaking wildfire year that resulted in the three largest wildfires in our state's history. The Cameron Peak Fire in Larimer County now stands as Colorado's largest fire at 208,913 acres. It burned through forests of high-elevation spruce-fir, lodgepole pine thick with beetle-killed trees and mixed conifer stands. The East Troublesome Fire, which started near Granby, became one of the quickest moving fires on record in Colorado as it engulfed stands of dead lodgepole pines at the epicenter of the state's mountain pine beetle outbreak in the mid-1990s. It became the state's second largest fire, traveling through the timber all the way to forests near Estes Park and eventually growing to 193,812 acres. Setting the state record for third largest, the Pine Gulch Fire north of Grand Junction torched 139,007 acres of grass, brush and timber fuels. All three eclipsed the previous record-holding Hayman Fire, which burned 138,114 acres.

The reasons why 2020's large, uncharacteristic fires grew so massive are complex. Of all the factors that led to a historic wildfire year, forest managers can directly address only one: the health of our forests. When forests in poor health combine with drought conditions, high winds, challenging terrain and warmer temperatures linked to climate change, it can turn a mild fire year into one that runs rampant long into the fall months and leaves us with smoke rising from underneath the year's first blankets of snow.

From an ecological perspective, fires like East Troublesome and Cameron Peak can have positive long-term impacts on natural environments. Fire plays an integral role in maintaining healthy forests and regenerating some forest types. From a human perspective, however, the wildfires last year were costly, causing loss of life and more than a thousand structures, numerous evacuations, closures of Interstate 70 and many recreation areas, poor air quality and

an increased risk of post-fire erosion that could impact water sources. The Grizzly Creek Fire burned forests on steep slopes on both sides of the Colorado River along the I-70 corridor. Its burn scar now threatens the water supply for not only Glenwood Springs but more than 40 million people downstream who rely on the Colorado River watershed for clean drinking water.

The East Troublesome Fire burned in a forest of heavy, downed, beetle-killed "jackstrawed" timber, named for the way the large logs haphazardly cover the forest floor like pick-up sticks and allow new trees to grow through these downed fuels. Add prolonged dry and windy conditions, such as those experienced during the fire's period of large growth in mid-October, and fire in these fuels can grow rapidly. These types of blazes create heavy smoke, scorch and degrade soils, burn rapidly through tree canopies and produce embers that create new spot fires.

Such embers allowed the East

80%

of Colorado residents rely on forested watersheds for clean drinking water



*Data: Colorado's Water Plan estimate
Photo: Williams Fork Fire, InciWeb*



Colorado residents saw visible drops in air quality during the 2020 wildfire season. This image of Lake Loveland taken at 2:30 p.m. Oct. 22, 2020, shows how smoke from the Cameron Peak Fire darkened skies along the Front Range. Photo: Amy Bulger, CSFS

Troublesome Fire to jump the Continental Divide in Rocky Mountain National Park, starting a spot fire that forced the evacuation of parts of Estes Park. During a notable 36-hour period in mid-October, East Troublesome burned through nearly 150,000 acres of forest, contributing to the loss of 580 structures and sending up billows of smoke that resulted in poor air quality along the Front Range.

As Colorado's population continues to expand into wildfire-prone areas, additional homes, lives and communities are at increased risk of being affected by fires. Post-fire impacts to water supplies and poor air quality due to smoke will continue to be significant public health issues.

Half of the state's population currently lives in the 3.2 million acres of the state designated as the wildland-urban interface (WUI), where human development meets or intermingles with wildland vegetation. Colorado government models project more than 7.7 million people will reside in the state by 2050. By then, the WUI area could encompass over 9 million acres.

The number of Coloradans living in the

WUI is increasing faster than landowners, the Colorado State Forest Service and its partners can perform mitigation work. Activities such as removing fuels, creating fuel breaks that protect neighborhoods, making defensible space around structures and reducing structural ignitability, as well as adopting Community Wildfire Protection Plans and land-use policies, are effective at reducing the risk of costly, high-severity fires, but the work needs to occur at a faster pace.

The Colorado State Forest Service already works with landowners and diverse partners to implement these necessary fuels reduction treatments across jurisdictional boundaries. But by working together on a larger scale, foresters and communities can focus on creating more fire-adapted communities and reducing forest stand densities to lower the risk of uncharacteristic wildfire. This will prepare residents already at risk and improve the health and resiliency of our forests, so when fires like those we saw in 2020 occur again, they are not as severe or as costly to our residents.



CSFS forester Adam Moore, left, presents a Firewise USA® award to Jim Vanderpool of Baca County Emergency Services for fire mitigation work completed in the Baca Grande residential area north of Alamosa. Community-driven mitigation efforts are increasingly important as residential areas sprawl farther into Colorado's wildland-urban interface. Photo: CSFS



A large air tanker drops fire retardant behind buildings at Colorado State University's Mountain Campus in Pingree Park. The October air mission and other firefighting efforts during the Cameron Peak Fire were successful at saving all campus structures, in part because of previous mitigation work done on the ground to lower wildfire risk. Photo: Cameron Peak Fire Incident Management Team

Previous Wildfire Mitigation Efforts Helped Save CSU's Mountain Campus

The Cameron Peak Fire roared through Colorado State University's Mountain Campus area in Pingree Park on Oct. 9-10, 2020. As flames torched the surrounding forests of lodgepole pine and mixed conifer, fire crews successfully saved all structures on campus, thanks to ongoing mitigation work.

A decade ago, CSU Housing and Dining Services and the Colorado State Forest Service embarked on a series of projects on the campus to protect structures and thin stands of beetle-killed trees in the wake of the mountain pine beetle epidemic. Staff with the CSU Mountain Campus and CSFS Fort Collins Field Office cleared thousands of trees growing adjacent to power lines, log cabins and other structures in critical areas around campus. Crews also felled and removed many hazardous trees.

At the time, the goal was to improve forest health and clear beetle-killed trees, and “by doing that, we also created a campus that was defensible from wildfire,”

The goal was to improve forest health and clear beetle-killed trees, and “by doing that, we also created a campus that was defensible from wildfire.”

— Greg Zausen, CSFS forester

said Greg Zausen, forester in the CSFS Fort Collins Field Office.

Over the years, CSU maintenance crews, volunteers, contractors, and students and faculty with the Warner College of Natural Resources continued this mitigation work, removing trees around buildings and power lines, planting a diversity of trees and shrubs to improve forest health and installing metal roofs on buildings.

Additionally, the CSFS has collaborated with a nonprofit organization in Fort Collins and other partners to harvest lodgepole pines from an area of the Mountain Campus that burned in the 1994 Hourglass Fire,

thinning the regenerating forest to promote forest health. These trees were given to low-income families that might not have been able to purchase a Christmas tree.

When the Cameron Peak Fire threatened the Mountain Campus last fall, the years of forest management work paid off.

Fire crews took advantage of the previous mitigation efforts to shore up defenses and save the campus. “On multiple occasions, fire operations teams called out and complimented us on our prior work done on campus,” said Seth Webb, Mountain Campus director.

The work done at the CSU Mountain Campus illustrates the importance of being proactive with fire mitigation activities and ongoing maintenance to lower wildfire risk and give firefighters a solid starting point to defend a property. Overnight, the Mountain Campus became a real-life example of how mitigation works — and how it helped a unique gem and learning center in Colorado's forest west of Fort Collins remain standing to welcome future generations.



BEFORE



AFTER

The same tree in the right foreground offers a landmark in an otherwise exceptionally different looking landscape. These before and after pictures show how a Colorado State Forest Service forest management project near Evergreen cleared dense standing timber to reduce wildfire risk on this homeowner's land. Tree thinning is one tool that can bolster forest health and protect property. Photo: Emma Brokl, CSFS

Changing Homeowner Perceptions Helps Protect Houses Near Evergreen

Sometimes, cutting down trees growing close to a house can be a daunting project for a homeowner who doesn't know what to expect. Removing trees around a home, however, is critical for creating defensible space, which is one factor that lowers the risk a home will be burned during a wildfire. Having good defensible space gives firefighters who may be called to defend a home an opportunity to strategically protect the property.

In the North Turkey Creek area near Evergreen, about 500 homes have been built in the foothills of the state's wildland-urban interface. The community has a high wildfire hazard rating because of overly dense trees, steep terrain and limited emergency access. Thankfully, community leaders and Evergreen Fire Rescue recognize this risk and are doing something about it — which includes efforts to change perceptions about cutting trees.

"The more you see fuels treatments, the more comfortable you get with them," said Emma Brokl, a Colorado State Forest Service forester in the Golden Field Office. "When wildfires come through this area, the risk can be mitigated."

Working with the CSFS and Evergreen Fire Rescue, community members created defensible space around two homes in the Evergreen Highlands neighborhood and made a 6-acre fuel break along a major evacuation route in the Timbers neighborhood. These treatments not only improve safe and effective response to wildfire and improve forest health, they serve as showcase examples of wildfire mitigation projects that meet standard guidelines for defensible space and fuel breaks.

By doing these treatments, Brokl said, the CSFS and Evergreen Fire Rescue now have powerful, on-the-ground examples to show

**WHAT'S YOUR
WUI RISK?**

**MORE THAN
HALF**

of Colorado residents live in the wildland-urban interface and are at some risk of being affected by wildfire.

Source: CSFS WUI Risk Assessment 2017

Learn more about the WUI risk in your county at coloradoforestatlas.org

more homeowners the benefits of creating defensible space around their homes. Public meetings and tours of the project sites are in the works, and the community and several partners received a federal State Fire Assistance grant to continue mitigation work in the area.

The Upper South Platte Partnership also supported this project and are partners in ongoing work in the North Turkey Creek community, and the U.S. Forest Service provided project funding.

Summit County Forestry Partners Work to Protect Multiple Communities

Where the forests meet civilization in Colorado — a place known as the wildland-urban interface — homes and communities stand in paths where catastrophic wildfires could blaze trails of devastation. To reduce this risk in Summit County, the Colorado State Forest Service is joining with partner agencies and private landowners to create fuel breaks and community protection zones in and adjacent to key populated areas near the White River National Forest. These strategic projects better protect hundreds of residents and homes and promote healthy, long-term forest conditions, increasing the likelihood residents and visitors alike will be able to enjoy Summit County destinations long into the future.

“Together we can do more,” said Ashley Garrison, a CSFS forester based in Summit County. “Building partnerships enables us to cross forest boundaries to create more effective treatments and be better stewards of our forests.”

The following on-the-ground examples of shared stewardship are funded through the voter-approved Summit County 1A Strong Future Fund, empowering Summit County government to work with the U.S. Forest Service, White River National Forest, CSFS, Denver Water and private landowners to prioritize and implement forest management projects in the county.

A Good Neighbor Authority agreement on USFS land in the project areas allows for the CSFS to assist with projects. The GNA program was expanded nationally in the 2014 Farm Bill, so the USFS and Bureau of Land Management can enter into agreements with state agencies like the CSFS to pool resources and ensure critical forest management work happens quickly.

PEAK 7 NEIGHBORHOOD — This 46-acre fuel break in Breckenridge lessens wildfire risk by breaking up the continuity of hazardous fuels, reduces impacts of future wildfires and creates a safer way for firefighters to engage wildfires. This project also protects Dillon Reservoir, part of the watershed that supplies drinking water to 1.5 million people downstream along the Front Range and beyond. This is a multi-year project with over 500 acres of strategic fuel breaks planned.

MINER’S CREEK — Dead and live lodgepole trees were cut and piled, leaving aspen, spruce, fir and lodgepole regeneration to



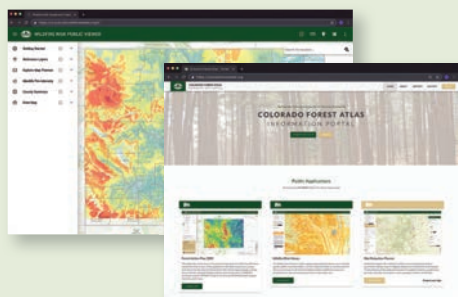
The Ponsse Ergo Harvester, a steep-slope extractor, made its Colorado wildfire mitigation debut last year on the Peak 7 forestry project, removing lodgepole pine above Breckenridge neighborhoods. Built like a tractor with robotic arms, the harvester can traverse steep inclines with minimal impact on the ground to cut trees, strip branches and stack logs for removal. “In the past, a project like this would have required a helicopter, which was expensive, or a hand crew,” said Bill Wolf, a Colorado State Forest Service forester. Photo: Denver Water

grow on 39 acres in Frisco. A popular trail system runs through this area south of the Peak 1 neighborhood and St. Anthony Summit Medical Center, highlighting the importance of forests for recreation and showing trail users firsthand how wildfire mitigation impacts forest health.

SWAN MOUNTAIN — North of Breckenridge, this 24-acre fuel break next to Tiger Road protects residents living outside of town and a vital power infrastructure. Regenerating lodgepole pine were removed in the area; spruce and fir were retained. Future fire intensity and fire spread will be reduced due to these fuel breaks.

GOLDEN HORSESHOE — Fuel breaks were linked and expanded across 94 acres near the Wellington neighborhood to decrease the risk of high-intensity fires and the potential for crown fires in the wildland-urban interface.

Colorado Forest Atlas: Distilling Forestry Data for Landowners, Working Partners



coloradoforestatlas.org

The Colorado State Forest Service made it easier for landowners, land managers and others to access information about Colorado forests with the click of a few buttons.

The Colorado Forest Atlas website, billed as a one-stop mapping shop for the public and partners, launched in May. This repository for forestry and wildfire risk data can help communities learn about wildfire

risk, aid in developing forest management projects and provide resources for writing forestry plans.

The atlas currently contains three apps: the public **Wildfire Risk Viewer**, the **Risk Reduction Planner** for partners and professionals and the **Forest Action Plan 2020**. A GeoTracks app is being developed in 2021, to be used by the CSFS to plan and track forestry projects and activities.

CSFS Leading Efforts to Address Wildfire in Colorado

Last year's wildfire season is yet another wake-up call that Colorado needs to invest more in the health of our forests to reduce fuels and mitigate wildfire risk. As the examples in this report — and many others across Colorado — show, we can make a difference for our residents, forests and watersheds.

As the state's lead forestry agency, the Colorado State Forest Service will take a number of actions to reduce the chances that future wildfires are as severe or costly as they were in 2020, including:

» **Participate** in partnerships, such as the Rocky Mountain Restoration Initiative, that work across boundaries, leverage resources and increase the pace and scale of forest health projects

» **Reduce** forest fuels and create fuel breaks that protect communities and watersheds, alter the behavior of uncharacteristic wildfire and enhance forest health

» **Promote** and support the growth of fire-adapted communities through planning, outreach and education, landscape treatments, and resident and community mitigation efforts

» **Grow** seedling trees through the CSFS Nursery for reforestation and conservation plantings

» **Serve** as a non-regulatory, non-biased, trusted and science-based resource for forestry advice and information for landowners

» **Provide** no-cost seedling trees through the Restoring Colorado's Forests Fund to help landowners reforest lands burned by wildfire or otherwise affected by natural disasters

» **Offer funding** support to homeowners associations, local governments, fire protection districts, utility providers and other groups through the Forest Restoration and Wildfire Risk Mitigation Grant Program

» **Investigate** and make data updates to the Colorado Wildfire Risk Assessment and associated applications in the Colorado Forest Atlas



The Living with Wildfire section in the 2020 *Colorado Forest Action Plan* details more goals, strategies and approaches for addressing wildfire in Colorado.

csfs.colostate.edu/forest-action-plan



Mike Till, a forester with the Colorado State Forest Service, plants a seedling as part of a reforestation effort near La Veta. Photo: Luke Cherney, CSFS

Wildfire Resources and Services

The Colorado State Forest Service offers a number of services to help residents, communities and land managers recover from wildfires, including:

- » Technical assistance for evaluating tree survival
- » Reforestation needs, including seedlings
- » Salvage of burnt timber
- » Hazard tree identification on non-federal lands

To learn more about these services, contact your local CSFS field office or visit csfs.colostate.edu.

For wildfire mitigation publications, resources and services, visit csfs.colostate.edu/wildfire-mitigation.

Colorado's Carbon Problem



Despite encompassing over 24 million acres, Colorado's forests emit more carbon than they store. We're one of the five worst Lower 48 states in forest carbon emissions by some estimates.

Colorado is contributing to a global problem, partly because our trees aren't as healthy as they could be. Living in a weakened state affects a tree's ability to take in and store carbon dioxide. Healthy trees that take in carbon dioxide help lower carbon concentrations in the atmosphere.



2 SOLUTIONS TO CURB EMISSIONS

Improving and maintaining forest health will improve forest carbon storage.

FACT: Over 22% of the standing trees in Colorado forests are dead wood.

Most are killed by insects (65%), disease (23%) and fire (4%). The decomposing dead wood releases carbon into the air instead of storing it. Increasing drought further stresses trees.

SOLUTIONS:

» **Manage** forests for healthy conditions and promote forest regeneration. Healthy trees not only absorb carbon dioxide and produce oxygen, they also absorb ozone, sulfur dioxide, nitrogen oxides and particulates.

» **Embrace** adaptive forest management practices to plan for future changes. Having different ages and types of trees makes forests more resilient.

FACT: Wood products generated by logging can store carbon. But timber markets are lacking and timber value has declined.

SOLUTION:

» **Support** a vibrant wood products industry with the capacity to meet forest management needs.

6 DISRUPTIONS TO COLORADO'S CARBON CYCLE



When we help forests, they return the favor



A rapid response to increase management and reforestation efforts will improve forest health and bring solutions to carbon problems. The CSFS is encouraged by legislative efforts underway on state and national levels to consider funding resources devoted to forest management. Colorado's forests require investment. Only then will they continue to support us.

3 ACTIONS IN PROGRESS

AT THE CSFS:

The 2020 *Colorado Forest Action Plan* recommends solutions to aid carbon storage through reforestation, forest and wildfire management, urban and community forestry and avoiding forest conversion.

These practices can be incorporated into the state's goals to reduce emissions following Colorado's Climate Action Plan.

AT THE STATE LEVEL:

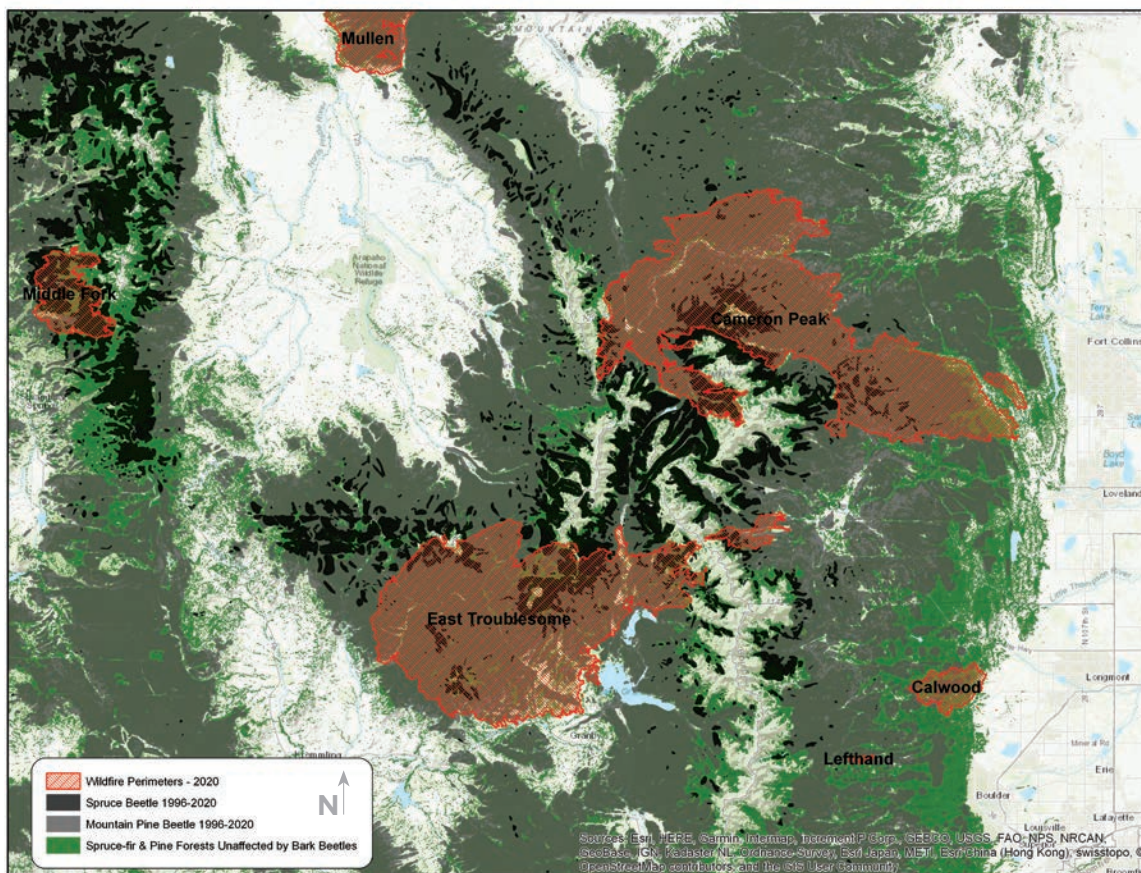
Colorado has an aggressive strategy for greenhouse gas reductions. House Bill 19-1261 requires reducing greenhouse gas emissions to at least 90% of 2005 levels by 2050.

The Colorado Natural and Working Lands Climate Task Force is developing recommendations for management and practices on forests, farms, urban

greenspace, rangelands and wetlands to help meet HB 19-1261 goals.

GLOBALLY:

Colorado is a member of the U.S. Climate Alliance, a bipartisan coalition of governors, state agencies and nonprofit organizations committed to reducing emissions in line with the 2016 Paris Agreement.



Where Beetle-Kill Timber and Wildfires Overlap

The two largest fires in Colorado history, Cameron Peak and East Troublesome, burned through forests heavily affected by mountain pine beetle and spruce beetle, as shown by the gray areas in the map. While not all trees in those areas had been killed or impacted, beetle outbreaks in those forests in recent decades resulted in fuel arrangement and fuel loads that likely contributed to the fires' behaviors and growth.

Burn perimeter data: National Interagency Fire Center. Insect data: U.S. Forest Service Aerial Detection and Forest Health Survey. Map: Dan West, CSFS

Exploring Interactions Between Bark Beetles, Wildfire

Bark beetles have affected many of Colorado's forests in recent decades, altering the arrangement of wildland fire fuels in many locations. Since the mid-1990s, mountain pine beetle has affected roughly 80%, or about 3.4 million acres, of ponderosa-lodgepole pine in the state, while the spruce beetle has caused tree mortality in approximately 40% of Colorado's high-elevation Engelmann spruce forests. When wildfires burn in forests dense with beetle-killed trees, the resulting fuel arrangement often significantly affects a fire's behavior, its ecological effects and options available for fire managers.

Drought conditions are ever important when considering wildfire — and equally important when considering bark beetles. Trees defend themselves from bark beetle attack through a series of resin ducts and chemical compounds therein. Precipitation has become more variable in recent years. With inadequate rain and snow fall, trees' ability to defend themselves from attack typically decreases as available resin is

Fire and Beetles

Interactive maps and information on fire and beetle interaction can be found at bit.ly/ForestHealthReport

reduced. During drought seasons, often lasting consecutive years, bark beetle populations may build to epidemic levels. Likewise, fire activity is most associated with years of below-average precipitation, when fuels are very dry, as they were in the summer and fall of 2020.

Regardless of drought conditions, standing trees infested and killed by bark beetles contain less moisture than live trees and contribute to a more complex fire environment since they ignite and burn more easily. Following tree death, needle transition and drop occurs, usually over a 1- to 3-year period. There is an increased possibility of active crown fire while needles remain on the trees through yellow, red and gray stages, but that risk is temporary. Oftentimes, greater forest and

fire management challenges occur after the needles have fallen, larger branches are shed and whole trees fall and become "jackstrawed" (intermingled large fuel arrangements of varying height).

Large accumulations of surface fuels can contribute to extreme fire behavior and rapid growth even if fires do not exclusively burn through tree crowns, particularly during very dry and windy conditions such as those that occurred at times during the 2020 fire season. Such surface fuel loads complicate fire management, produce significant amounts of smoke while burning, can readily transition fire to remaining green trees in the right conditions and can result in increased burn severity through soil heating than would otherwise occur.

The arrangement and condition of fuels affected by widespread beetle infestations intertwine with weather conditions and topography to affect wildfire behavior — and can pose a higher risk of uncharacteristic fire. More research is needed to improve our understanding of the interactions between bark beetles and wildfires.

Spruce Beetle Remains Colorado's Most Damaging Forest Pest

Since the 1950s, forest managers have taken to the skies to detect and monitor disturbances to forests from insects and disease, collecting data that provides an annual snapshot of forest health conditions in Colorado.

Due to pandemic safety protocols in 2020, trained aerial observers with the U.S. Forest Service Rocky Mountain Region and Colorado State Forest Service only flew over priority areas, where there was a likelihood of forest pests causing widespread tree mortality.

In total, they monitored 16.3 million acres last year, compared to 30.2 million acres in 2019. Because of the reduced acreage flown, numbers of affected acres are not included in this report since comparison between years is not possible.

Despite the restricted flights, observers were able to detect and track a number of forest pests causing disturbances in previously unaffected areas.

For the ninth consecutive year, spruce beetle remained the most destructive forest pest in Colorado. While the intensity of spruce beetle and Douglas-fir beetle activity decreased in 2020, many areas adjacent to previously affected forests continue to experience tree mortality. Some forested areas experienced localized, moderate to severe bark beetle infestations as well.

Weather plays an important role in insect and disease activity, as noted in the bark beetles and wildfire information on page 12. In 2020, winter and spring had average precipitation amounts. Thereafter, severe and extreme drought conditions across most of Colorado occurred through the summer and fall. These drought conditions compounded forest disturbance and further set the stage for bark beetles and tree defoliating insects to build populations in 2021.

Spruce Beetle

[Dendroctonus rufipennis]

Spruce beetle continues to infest high-elevation Engelmann spruce throughout



Aerial surveys in 2020 were limited to priority areas of the state, such as Wolf Creek Pass, where spruce beetle continues to infest forests and grow populations. Photo: Dan West, CSFS

much of Colorado. Since 2000, this small, native bark beetle has affected at least 1.88 million cumulative acres of forest.

Newly infested forests in eastern Gunnison and western Chaffee counties are experiencing severe, intense infestations. Spruce beetle populations in 2020 increased in Hinsdale, San Juan and La Plata counties. Beetle outbreaks in Huerfano and Custer counties continue to expand as well, though not as rapidly. In Grand County, the intensity of infestations has declined from past years as the beetle continuously depletes large-diameter Engelmann spruce from the forest.

Douglas-fir Beetle

[Dendroctonus pseudotsugae]

Douglas-fir beetle continues to cause significant Douglas-fir tree mortality in the central and southern forests of Colorado, having depleted many of the largest trees in this area of the state over the past decade.

Gunnison, Saguache, Hinsdale and Mineral counties continue to see severely affected Douglas-fir stands. While many of the larger diameter trees have died in

recent years, smaller diameter trees are now susceptible to attack and are currently succumbing to the beetle.

Drought conditions exacerbated beetle activity in 2020, and the summer of 2021 is forecast to see significant bark beetle-caused tree mortality as a result of the ongoing drought.

Western Spruce Budworm

[Choristoneura freemani]

Western spruce budworm is a defoliator of Douglas-fir, white fir, and Engelmann and blue spruce. In its caterpillar stage, the insect partially consumes the needles, leaving a rust/burnt color to the remaining foliage not fully consumed by the budworm. Trees repeatedly damaged by budworm over numerous years are at high risk of attack from Douglas-fir beetle, which can build populations quickly and cause widespread mortality.

Forests in south-central Colorado infested by this budworm are experiencing intense disturbance, with Saguache, Gunnison, Chaffee, Park and Fremont counties among the most affected in 2020.

Interactive Maps and Data on these and other forest insects and diseases: bit.ly/ForestHealthReport



Once popular as windbreaks and privacy divisions, Russian olives are now on Colorado's invasive species list. A project is underway at Jackson Lake State Park and nearby state wildlife areas to remove the invasive species, replacing them with native and noninvasive trees, shrubs and grasses to restore natural habitat. Photo: Dustin Dorskocil, Colorado Parks and Wildlife

Stunting the Spread of a Jackson Lake Invader

Eighty miles east of Denver where wind whips the northeastern plains near Jackson Lake, the Colorado State Forest Service is working to keep in check a hyperactive invasive species that pushes out native vegetation.

The CSFS is removing about half of the Russian olives that line picnic areas, campsites and hunting spots around Jackson Lake State Park and the nearby Andrick Ponds and Jackson Lake state wildlife areas.

Introduced over 50 years ago in the U.S. as a popular windbreak, this stalwart tree grows quickly, feeding more than 50 species of wildlife with its fruit and providing shelter beneath thick branches. Yet its invasive tendencies for adapting, spreading and overtaking native plants landed it on the Colorado Department of Agriculture's noxious weed list in 2002. When it takes over an area, it can impact avian nesting and brooding and add nitrogen to the soil, which disrupts natural nutrient cycling and taxes water quality.

It's also a silent drain the Colorado plains can't afford. Though difficult to quantify, some research estimates one Russian olive near a water source may consume about 75 gallons of water a day — more than the average 50 gallons per day a residential Denver Water customer uses.

"Russian olives use a lot of water," said Matt Norville, the CSFS Northeast Area forester overseeing the Morgan County project. "There are some areas around Jackson Lake State Park where ground vegetation won't even grow because of these trees. All

the water those Russian olives are using isn't getting used for agriculture, or for the state park, or surrounding vegetation."

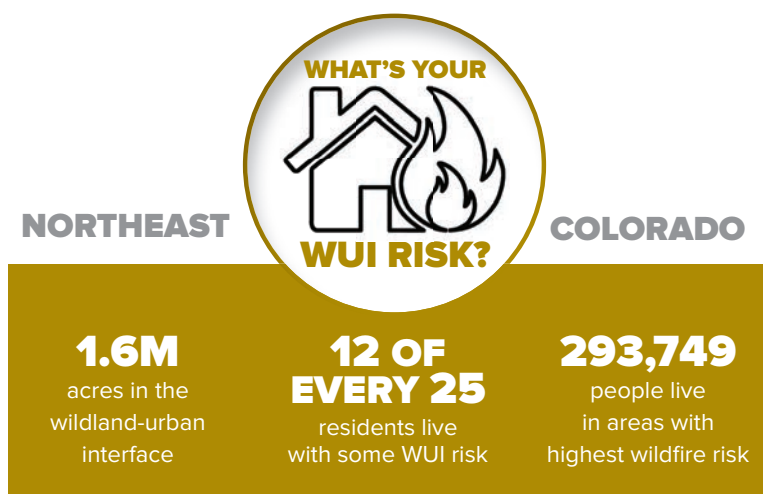
The 39-acre CSFS project to manage this invasive species includes cutting and applying herbicide to ensure stumps don't sprout new growth. The cut trees will be removed or chipped. To improve and restore natural habitat for wildlife, hunters and other recreation seekers, a variety of native and noninvasive trees,

The 3- to 5-year project will help control the invasive Russian olive, improve water quality and quantity and re-establish habitat.

shrubs and grasses will be planted where Russian olives are taken out. The 3- to 5-year project will help control the invasive Russian olive, improve water quality and quantity and re-establish habitat.

In partnership with Colorado Parks and Wildlife and with funding from its Wetlands for Wildlife grant, work has begun in a multi-phased approach to respect the high public demands on these three state recreation areas that welcome more than 200,000 visitors each year.

"For hunters, it will be beneficial in the long run because, ecologically, we're creating better habitat to attract more birds. Positive impacts to the wildlife species may bolster hunting and birdwatching activities on these properties," Norville said.



Source: CSFS WUI Risk Assessment 2017. "Highest risk" is levels 7-9 on WUI scale. Access WUI risk data specific to each county at coloradoforestatlas.org.

Forest Health Issues

Emerald Ash Borer

[Agrilus planipennis]

Considered the most destructive tree pest ever introduced in North America, the emerald ash borer further spread across the northern Front Range. New detections of EAB in 2020 occurred in Louisville, Arvada and north of Fort Collins, all outside of a former quarantine area.

Last year, the Colorado Department of Agriculture repealed the quarantine encompassing Boulder County. The insect was detected outside of the quarantine zone in 2019. While the quarantine served its purpose, giving communities time to prepare for EAB, the threat of this insect remains as it spreads to new cities and towns. About 15% of all trees in Colorado's urban forests are ash.

In 2020, the CSFS implemented the "Your Ash is on the Line" project to help small and mid-sized communities along the Front Range prepare for EAB. Resources for the project, including a recording of an ash wood utilization workshop held in 2020, are available at csfs.colostate.edu/eab.

Frost Damage

Weather played a role in damaging trees in the Northeast Area in 2020. An October cold snap followed warm weather in the fall of 2019. This didn't give trees a chance to transition to dormancy. As spring arrived, extreme temperature fluctuations in mid-April 2020 compounded injuries and stress sustained in the fall.

This resulted in frost damage in ponderosa and other pine species, spruce and deciduous trees. CSFS foresters and residents noticed damage across the Front Range; however, trees in Douglas, El Paso and Elbert County communities were particularly affected. Frost-damaged pine and spruce had a range of symptoms, from just the tips of needles being affected to all upper foliage changing to white or straw-colored.

Unfortunately, little could be done for the damaged trees, said Meg Halford, a forester in the CSFS Franktown Field Office. If this occurs again, she advises residents to give the trees a chance.

"Buds on frost-injured trees may survive, and they may produce new growth," Halford said. "Don't count them out just yet, and ensure these stressed trees get plenty of water."

Empowering Boulder County Residents to Fight Wildfires Before They Begin

With prophetic timing last August, Boulder County officials launched an innovative, community-driven plan for forest management, focused on dousing the risk of wildfires before they start.

By October, the CalWood and Lefthand Canyon wildfires were burning within county boundaries, causing evacuations and spreading already exhausted firefighting resources even thinner.

"The fires highlight the reason there needs to be this kind of cross-boundary effort," said Ben Pfohl, a forester with the Colorado State Forest Service in Boulder. "Those fires burned over 10,000 acres, but there are still a lot of acres at risk in the county."

Residents know about risk. Since 1989, more than 260 homes and structures in the county have burned in wildfires. A CSFS wildland-urban interface risk analysis reveals at least 25,000 Boulder County residents live in areas with elevated risk of wildfires impacting lives and property. The county also supplies water to more than 300,000 downstream residents and offers forested habitat for more than 90 species of wildlife and native plants.

As the CSFS, federal, state and local partner agencies dig into the Memorandum of Understanding signed in August, they're finding coordinated ways to reduce wildfire risk and better protect Boulder County residents, watersheds, recreation areas and natural resources.

The Saint Vrain Forest Health Partnership, led by the Lefthand Watershed Center, was formed to develop and guide MOU work in the Saint Vrain watershed. Key to this partnership is the participation of local stakeholders in planning and implementation processes, along with numerous MOU partners.

The CSFS — skilled at working across boundaries on forest management projects throughout the state — will help establish focus areas and offer project support with forestry data and resources.

One crucial piece of the plan has already begun — educating and supporting residents about wildfire risk and mitigation.

"Five years from now, we want momentum from the community to support these projects and drive the process," Pfohl said. "The goal is to have treatments done spanning public and private land. But, just as important, the community will help define the goals and successes. They'll be able to articulate and know the risk to their forests and watersheds, and also know how to move forward."



Part of making areas safer includes monitoring tree health. At Lake Pueblo, CSFS foresters evaluated 191 trees in 2020, marking safety issues such as dead trees overhanging popular trails, left, and rotting limbs at risk of falling near picnic areas. Photos: Vince Urbina, CSFS

Keeping Outdoor Recreation Safer at Lake Pueblo

One of the last things that comes to mind when heading to a state park to recreate is to watch out for dangerous trees. That's thanks in part to the Colorado State Forest Service's work doing hazard tree assessments, which helps ensure our state's recreational destinations remain safer for visitors. Trees are an important part of the landscape at Lake Pueblo, providing wildlife habitat, wildlife viewing, small game and waterfowl hunting and shade along trails and rest areas for park visitors.

Last year at Lake Pueblo State Park — one of the most popular state parks in Colorado with annual visitors exceeding 2.4 million — CSFS foresters assessed 191 trees over 200 acres of land, focusing on trails and campground areas. Trees with the 75 highest scores for safety concerns based on the Colorado Tree Coalition Tree Risk Assessment/Management Rating system inventory were tagged for mitigation. Colorado Parks and Wildlife will handle the mitigation and potential removal of these trees.

Foresters inspected trees for broken and hanging limbs, large dead limbs and other hazards such as trees compromised by insects or disease that could cause injury or harm to people and structures if they were to fall within the park. The 75 earmarked trees included willows and Siberian elms, but the worst offenders were larger cottonwoods, some of which were burned or rotting. These large, hollow cottonwoods pose a risk because they do not have enough sound wood to support the tree in an upright position

when strong wind events occur.

"We make things happen on the ground so that landowners can meet their land use and stewardship objectives," said John Grieve, the CSFS supervisory forester in the Southeast Area who worked on the hazard tree assessment.

Last year at Lake Pueblo State Park, CSFS foresters assessed 191 trees over 200 acres of land, focusing on trails and campground areas.

Being able to enjoy the great outdoors was an important part of daily life in 2020, and hazard tree assessments help land managers mitigate risk to people so they may recreate more safely in public spaces. The Lake Pueblo assessments helped reduce risk to park users by flagging dead trees and branches for removal; they also ensured high-use spaces like trails and public gathering areas, such as gazebos and picnic tables, had reduced risk for problematic trees to impede use in these areas. Tree risk assessments are a continuation of a CSFS forest stewardship project at Lake Pueblo State Park that began in 2013.



SOUTHEAST

COLORADO

3.7Mforested acres
in southeast
Colorado**860K**acres in the
wildland-urban
interface**15 OF
EVERY 25**residents live
with some WUI risk**218,212**people live
in areas with
highest wildfire risk

Source: CSFS WUI Risk Assessment 2017.
 "Highest risk" is levels 7-9 on WUI scale. Access WUI risk
 data specific to each county at coloradoforestatlas.org.

Forest Health Issues in Southeast Colorado



Photo: Dan West, CSFS

Spruce Beetle

[Dendroctonus rufipennis]

Spruce beetle continues to infest new acres of high-elevation Engelmann spruce-fir forest in the Southeast Area, while also increasing its impact on already infested forest. This native bark beetle is most widespread in Custer, Fremont and southern Park counties, but smaller populations of the insect exist throughout the area.

The CSFS has held salvage timber sales on hundreds of acres of spruce beetle-infested forests in recent years, but more trees are being killed than can be brought to market. Remoteness, terrain and seasonal limitations can make access to treating spruce stands difficult. Even in accessible stands, it's a challenge to harvest and fully utilize the beetle-killed wood before some of it deteriorates.

Remnant beetle-killed trees increase the risk of high-severity fire, which consequently elevates the risk to important headwaters and air quality.



Photo: Stephen Rudolph, CSFS

Western Spruce Budworm

[Choristoneura freemani]

This forest pest is widespread throughout the Southeast Area in Douglas-fir and white fir forests. Infestations of western spruce budworm are especially prevalent in western Fremont County and the Wet Mountains in Custer and Huerfano counties. A lack of disturbance in these forests has resulted in dense stands of trees with multiple canopy layers, which are ideal conditions for the insect.

The budworm feeds on buds and new shoots, causing the tops and branches of host trees to turn reddish-brown. If the infestation is severe and persists over a long time, trees will eventually die, or become susceptible to bark beetles.

To mitigate the budworm's impact, CSFS foresters harvest trees through targeted treatments, creating areas with well-spaced trees growing at uniform height. This creates favorable conditions for species not susceptible to western spruce budworm, such as aspen and pine, to regenerate, while lowering the risk of high-severity fire.



Photo: CSFS

Drought Stress

Drought remains a persistent issue that affects all forest types across the Southeast Area. It can kill trees or weaken and predispose them to a host of health issues. While trees try to acclimate to the dry conditions, it is difficult for them to adjust and take advantage of precipitation when it falls.

The ongoing drought in the Southeast Area is placing a long-term stress on trees that's compounding year after year.

In 2020, due to a dry spring and drought that was prevalent through the end of the year, trees faced a tough growing season.

To address the issue, CSFS foresters harvest unhealthy trees from dense stands so remaining trees have more resources, promoting individual tree vigor and overall forest health.



Foresters and contractors clear trees affected by mountain pine beetle near Gunnison. Photo: Kellon Spencer, kellonspencerphotography.com

Controlling Beetle Outbreak a Race Against Time

While time seemed to slow down for many last year with stay-at-home orders due to COVID-19, foresters in Gunnison County were in a rush to contain an outbreak of another kind – the mountain pine beetle.

Working quickly to prevent the beetle outbreak from becoming an epidemic around the Taylor Canyon area as it has in other parts of the state, the strength of partnership made all the difference. In a record-breaking 4-month-long effort, the Colorado State Forest Service, National Forest Foundation and U.S. Forest Service completed the planning, public engagement and implementation for phase one of the project.

“Although mountain pine beetles, in small populations, are an important native beetle to our Western forests, we are hoping to keep them in check so we continue reaching our goals of managing for diverse, healthy and resilient forests in the future,” said Sam Pankratz, supervisory forester with the Colorado State Forest Service in the Southwest Area.

Had the beetle continued to increase populations at a rapid pace within lodgepole pine tree stands in this area, the risk of a catastrophic wildfire in the forest would greatly increase. Swift treatments helped reduce the spread of the bark beetle to adjacent healthy stands, mitigate wildfire risks and protect critical infrastructure in Taylor Canyon before the mountain pine beetle flight period in July 2020.

This urgent, cross-boundary forest management project is centered about 13 miles northeast of Gunnison, in the Wilder on the Taylor and Gunnison Highlands communities near Taylor Canyon. This portion of the Taylor River watershed houses two

growing subdivisions with 63 different parcels and covers both private and National Forest lands. Treatments were completed on seven private parcels, as well as adjacent USFS lands.

Last year our state got a glimpse of how fast wildfires can quickly become devastating as they spread through forests thick

Working quickly to prevent the beetle outbreak from becoming an epidemic as seen in other parts of the state, the strength of partnership made all the difference.

with beetle-killed trees. The mountain pine beetle affected nearly 3.4 million acres of forests in Colorado from 1996 to 2014.

“I am extremely impressed at the rapid collaborative effort that has taken place over the past few months aimed at reducing potential impacts from mountain pine beetle in the Taylor River and Taylor Park areas,” Pankratz said.

A total of 260 acres were treated and approximately 47,419 beetle-infected trees were removed to improve forest health and reduce fuel sources. By proactively treating as many infected and vulnerable stands as possible, foresters hope to slow the outbreak within three years and return the forest to its once thriving condition. Funding for phases one and two, completed in December 2020, was provided by the USFS, NFF and private landowners. Additional funding is needed to begin further treatment phases.



SOUTHWEST

COLORADO

9.6M

forested acres
in southwest
Colorado

772K

acres in the
wildland-urban
interface

**21 OF
EVERY 25**

residents live
with some WUI risk

66,198

people live
in areas with
highest wildfire risk

Source: CSFS WUI Risk Assessment 2017.
"Highest risk" is levels 7-9 on WUI scale. Access WUI risk
data specific to each county at coloradoforestatlas.org.

Forest Health Issues in Southwest Colorado



Photo: David Casey, Dolores Ranger District,
San Juan National Forest

Roundheaded Pine Beetle

[Dendroctonus adjunctus]

Roundheaded pine beetle is a native bark beetle that attacks ponderosa pine. It is often found with several other species of bark beetles — typically western pine beetle, pine engraver beetles and mountain pine beetle. Working in conjunction, these insects produce a "bark beetle complex" that results in tree injury and death.

In the Southwest Area, roundheaded pine beetle remains active, primarily in Dolores and La Plata counties. It is particularly active in The Glade area of the San Juan National Forest northwest of Dolores and the Cherry Creek drainage in western La Plata County. Smaller populations can also be found in adjacent forests.

To address the issue, CSFS foresters are working with the Ute Mountain Ute Tribe to treat an outbreak on land owned by the tribe in western La Plata County. Foresters have also partnered with federal and local agencies on forest health projects in Montezuma County and other nearby counties to reduce the risk of the beetle's impact.



Photo: CSFS

Western Spruce Budworm

[Choristoneura freemani]

Western spruce budworm continues to be Colorado's most damaging and widespread forest defoliator. In the Southwest Area, the budworm is spreading throughout the San Juan and La Plata mountains and north into the San Miguel Mountains in Dolores and San Miguel counties. It is also active in forests in and around the San Luis Valley.

For several years in a row, moisture and temperature levels have fluctuated wildly in the Southwest Area and a drought has gripped the region. Combined, these weather patterns stress trees. Western spruce budworm defoliation further stresses trees, leaving those infested by the budworm more susceptible to bark beetle attack.

The combination of weather factors and budworm activity is weakening trees in the Southwest Area, setting the stage for potential bark beetle outbreaks in the future.



Photo: CSFS

Spruce Beetle

[Dendroctonus rufipennis]

Colorado's most damaging forest pest continues to be active in the Southwest Area. Spruce beetle is moving into previously uninfested forests in the Needle Mountains in Archuleta and San Juan counties, as well as the north-central San Juan Mountains within Hinsdale and Gunnison counties.

Since 2016, the CSFS has worked closely with partners to help spruce-fir forests recover and build resiliency to the spruce beetle.

Treatments include thinning trees in greener forests to increase the variety of tree ages and species and remove dead and dying spruce from stands experiencing excessive mortality. Local saw mills process logs into usable lumber, locking up carbon in forest products, supporting local economies and reducing the potential for high-intensity wildfires.



The CSFS oversees the Owl Mountain Good Neighbor Authority project near Walden. Granby's Colorado Timber Resources has purchased wood from the project, which helps regenerate the forest, as well as the state's declining timber industry. Photo: Carolina Manriquez, CSFS

In Balance: Forest, Industry Benefit at Owl Mountain

In the southeast corner of Jackson County, the forest landscape at Owl Mountain is improving while at the same time bolstering revenue for the timber industry.

Despite a declining wood products industry in the state, the Colorado State Forest Service is helping sustain this local economy in northwest Colorado through the Owl Mountain Good Neighbor Authority project. This 376-acre project spanning private, state and Department of Interior/Bureau of Land Management properties will reduce fire risk on the landscape while also creating jobs for area loggers and timber mills and generating revenue for state and federal agencies through a timber sale. Approximately \$180,000 worth of wood has been sold to Colorado Timber Resources, a Grand County lumber mill that will turn the trees into 2x4 studs for use in construction.

These future studs come from harvesting dead beetle-killed lodgepole pine and spruce, as well as some live trees greater than 9 inches in diameter that are likely to blow over if left standing. The logging operation gives this area of forest a chance to regenerate. The newer, younger trees that grow back will help create a more resilient landscape, increase age and structure diversity and improve forest health and habitat for wildlife in an area long known as a great hunting destination, where many species of animals roam under the forest canopy.

The Owl Mountain Good Neighbor Authority project also offers potential economic protection for the future.

"Every dollar spent to remove trees from fire-prone forests would save approximately \$7 in avoided firefighting costs," said Carolina Manriquez, a Northwest Area CSFS forester.

It also helps protect a critical watershed – the headwaters

Despite a declining wood products industry in the state, the Colorado State Forest Service is helping sustain this local economy in northwest Colorado.

of the North Platte River, which runs from North Park through Wyoming to Nebraska and provides water to neighboring states.

Funding through the GNA agreement comes from the project participants: the Bureau of Land Management, the Colorado State Land Board and an adjacent private ranch owner.

Throughout the project, CSFS foresters are working diligently to assist the landowner in accomplishing project-related work, thereby strengthening community partnerships and promoting forest stewardship into the future.

"That's the beauty of the work we get to do. We can implement treatments at the landscape level by leveraging our relationships with private landowners to work in places where that wouldn't have happened otherwise," Manriquez said.



NORTHWEST

8.6M

forested acres
in northwest
Colorado

611K

acres in the
wildland-urban
interface



COLORADO

**18 OF
EVERY 25**

residents live
with some WUI risk

92,468

people live
in areas with
highest wildfire risk

Source: CSFS WUI Risk Assessment 2017.
"Highest risk" is levels 7-9 on WUI scale. Access WUI risk
data specific to each county at coloradoforestatlas.org.

Forest Health Issues in Northwest Colorado



Photo: John Twitchell, CSFS

Subalpine Fir Decline

Across higher elevations in the Northwest Area, a decline in subalpine fir is becoming more prevalent, with groups of trees turning red before dying. Both younger and mature trees are affected, particularly around Rabbit Ears Pass and Buffalo Pass in the Routt National Forest, in north Routt County and even around Steamboat Springs and Emerald Mountain.

A combination of *Armillaria* root rot and western balsam bark beetle (*Dryocoetes confusus*) is likely causing the decline in subalpine fir, exacerbated by ongoing drought that has weakened tree defenses.

Aside from harvesting infested trees before adult beetles fly the following year, foresters can do little to curtail the problem, since *Armillaria* fungi are present in the soil and western balsam bark beetle populations are considered endemic. In certain areas impacted by this decline, however, dead trees have been removed to address public safety issues and reduce wildfire risk.



Photo: Ron Cousineau, CSFS

Lodgepole Pine Beetle Kill

While the mountain pine beetle epidemic has subsided in the Northwest Area (and across most of the state), the impacts of this native bark beetle on forests continue. Across forests in Grand, Jackson, Summit and Routt counties, many new, young trees are growing through dead and downed lodgepole pines. This creates high fuel connectivity, with continuous vegetation from the forest floor to the tree canopy. These fuel conditions are concerning and exemplified by the wildfires in 2020.

To address the problem, the CSFS has removed fuels from tens of thousands of acres of state and private forestland that has grown thick with beetle-killed trees, with some areas containing up to 90% dead timber. Foresters at the CSFS continue to work on these lands and develop new federal partnerships to work across land ownership boundaries to remove more forest fuels. This reduces the chance of more uncharacteristic fires in the Northwest Area and helps ensure the regenerating forest is healthy now and into the future.



Photo: Dan West, CSFS

Piñon Ips

(*Ips confusus*)

In the Northwest Area, the piñon ips beetle continues to attack new stands of piñon pines. Despite being a native insect, this bark beetle is a tree killer, affecting piñon-juniper forests in the Glade Park and Gateway Canyon areas of Mesa County, the Cedaredge area of Delta County and around Rifle in Garfield County. Extreme drought in these areas (and statewide) has stressed piñon trees, leaving them susceptible to attack and allowing the piñon ips beetle to build populations.

Beetle-killed trees left on the land increase the risk of high-severity wildfire, so CSFS foresters work with residents to offer science-based guidance on managing their forests to prevent problematic piñon ips beetle infestations. In 2020, the CSFS published a new guide for managing for this beetle, available at csfs.colostate.edu or by contacting a local CSFS field office.

Grant-Funded Mitigation Helped Defend Bear Creek Houses

When the Bear Creek Fire ignited on Nov. 19 near a Colorado Springs neighborhood, it burned right up to fences and backyards and quickly spread to 23 acres. A video captured by a homeowner's backyard camera, played later in news clips, shows firefighters keeping flames at bay near a deck. It was an unsettling image, but one Bear Creek Cañon Park residents had spent years preparing for.

Prior wildfire mitigation projects that began in 2016 helped this community turn the emergency into a story of success. As the wildfire took hold, residents evacuated from about 235 homes. But a few hours later, all were allowed back to a welcomed sight — every home remained undamaged.

"We have so many residents in Colorado Springs who take mitigation seriously. I can't thank them enough," said Colorado Springs Fire Department Fire Chief Ted Collas at a press conference the day of the fire. "The mitigation efforts they have taken, and some of the mitigation efforts we've done with our own fire department in the open space areas, kept the fire low to the ground."

The success came in part because property owners and city foresters — all motivated to curb wildfire risk — had the state's financial support to get work done with a Colorado Department of Natural Resources Wildfire Risk Reduction grant. The grant allowed for projects to take place that connected other mitigation work also completed on the landscape.

Management of the DNR grant program transferred to the Colorado State Forest



Crystal Martin's Ring camera shows firefighters in her backyard defending her home from the 2020 Bear Creek Fire in Colorado Springs. The neighborhood was praised for completing wildfire mitigation work that helped firefighters quickly suppress the blaze. Photo: Crystal Martin

More About Grants

Information about the CSFS Forest Restoration and Wildfire Risk Mitigation Grant Program is online at csfs.colostate.edu/funding-assistance

Service in 2017. Combined with the CSFS Forest Restoration grant, it was renamed the Forest Restoration and Wildfire Risk Mitigation Grant Program. It uses state severance tax funds to support forest restoration, wildfire mitigation and capacity building projects on non-federal land, assisting homeowners associations, fire districts, counties, cities and more.

Demand for funding has consistently exceeded the amount of funding available. In 2020, the CSFS received 65 applications — with funding requests for over \$5.07 million.

The Colorado Legislature allocated an additional \$1 million for FRWRM funds in 2020, allowing the CSFS to award over \$1.4 million to applicants. Awards for successful grant applications will be made in April 2021. Legislative changes in the 2020-2021 grant cycle also allow for grant funds of an individual project to cover up to 75% of the total project cost for projects located in areas with fewer economic resources. In all other project locations, funds will continue to cover up to 50% of the total project.

Report Acknowledgments

The following individuals and groups provided content, guidance and technical review for this report:

- U.S. Forest Service, Region 2, State and Private Forestry and Tribal Relations, and the Forest Health Management group
- Dan Gibbs and Angela Boag, Colorado Department of Natural Resources
- Colorado Parks and Wildlife
- Seth Webb, Colorado State University Mountain Campus Director
- Dan West, Forest Entomologist, CSFS
- CSFS program division staff and associate directors
- CSFS field office personnel

Cover Photography

Top: A CSFS fuels reduction project in the Miner's Creek area near Frisco was one of several 2020 wildfire mitigation projects in Summit County. Read about other Summit County projects on page 9. Photo: Bill Wolf, CSFS

Bottom left: CSFS Forester Mike Till plants seedlings in a burn area. Photo: Luke Cherney, CSFS. **Center:** The Grizzly Creek Fire burns along Interstate 70 near Glenwood Springs, seen by a group tubing down the adjacent Colorado River. Photo: InciWeb. **Right:** CSFS Forester Carolina Manriquez snaps a selfie while leading a media tour at the Owl Mountain Good Neighbor Authority project site near Walden. Read about the project on page 20.

CSFS: Serving Colorado Communities for Over 65 Years

Since 1955, the Colorado State Forest Service has served the residents and communities of Colorado by helping manage trees and forests on private and public lands across the state. With 17 field offices and over 100 staff, the CSFS works alongside landowners and diverse partners to improve forest health, offering:

- » Leadership, resources and guidance in forest management
- » Wildfire risk reduction and community planning
- » Adaptive forest management to address climate change
- » Wood utilization and marketing support
- » Outreach and education to youth and adults
- » Insect and disease detection, surveys and response
- » Forest monitoring, inventory and data analysis
- » Seedling trees and other plants for conservation projects
- » Urban and community forestry assistance



Carolina Manriquez, a Colorado State Forest Service forester, shows a seedling to a young volunteer at the annual ReTree tree planting event. Photo: Yampa Valley Sustainability Council

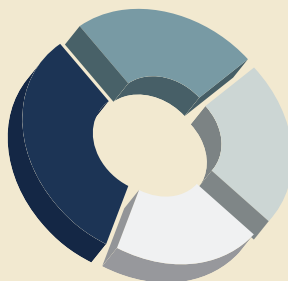
With headquarters in Fort Collins, the CSFS is a service and outreach agency of the Warner College of Natural Resources

at Colorado State University and provides staffing for the Division of Forestry within the Colorado Department of Natural Resources.

CSFS Budget Analysis: Fiscal Year 2020

The Colorado State Forest Service provides forestry services throughout the state as an agency of Warner College of Natural Resources at Colorado State University. In 2020, CSFS employed 125 staff and 57 student and non-student hourly employees at the Fort Collins state office and 17 field offices around Colorado.

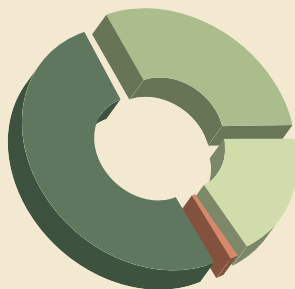
Annual CSFS budgets originate from a variety of sources, including federal grants, state general fund and other state funds, self-funded operations and other revenues, severance tax and wildfire risk reduction funding. Over the span of five fiscal years (FY2016 – FY2020), the CSFS has continued to grow in capacity while responding to new opportunities to support our mission.



2020 TOTAL BUDGET: \$15.7 MILLION

FUNDING

33%	Federal grants [\$5.2 million]
24%	State general fund, state grants and service-based revenues [\$3.8 million]
23%	Self-funded operations and other revenues [\$3.5 million]
20%	Severance tax [\$3.2 million]



EXPENDITURES

51%	Personnel services [\$8.1 million]
30%	Operating expenses [\$4.7 million]
18%	Grants to others [\$2.8 million]
1%	Payments to other agencies [\$0.05 million]

*capital improvements/equipment accounted for surplus in 2020

WE NEED OUR FORESTS, MORE THAN EVER.

Since the global pandemic arrived in early 2020, Colorado's wild and urban forests have been havens where residents can find solace and joy, exercise, rest and feel the healing benefits of connecting with nature.

Our forests will continue to offer respite as we face ongoing challenges – stalwart reminders that Colorado is truly something special and worth our efforts to protect.



Photo: StockSnap, Pixabay



COLORADO

Department of
Natural Resources

.....
Division of Forestry
1313 Sherman St., Room 718
Denver, CO 80203
(303) 866-3311
dnr.colorado.gov



.....
Colorado State University
5060 Campus Delivery
Fort Collins, CO 80523-5060
(970) 491-6303
csfs.colostate.edu



**WARNER COLLEGE
OF NATURAL RESOURCES**
COLORADO STATE UNIVERSITY

.....
Colorado State University
1401 Campus Delivery
Fort Collins, CO 80523-1401
(970) 491-6675
warnercnr.colostate.edu

OUR MISSION

*To achieve stewardship of Colorado's diverse forest environments
for the benefit of present and future generations*